

# K-shape InAs Nanowires; Dual Role of Gold Droplets in the Growth of Reclined Nanowires

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The growth of ‘K’-shape InAs nanowires, consisting of two interconnected wurtzite wires with an additional zinc-blende wire in between, is reported. Occasionally, the growth results also in formation of a purely wurtzite two-dimensional plate between the zinc-blende nanowire and one intersecting wurtzite arm [1]. By modeling the crystal structure we explain the transformation from wurtzite to zinc-blende and the coexistence of both crystallographic phases in such nanowire structures.

The K-shaped structures are obtained by using {001}-oriented substrates, on which the nanowires usually grow with their growth axis along one of the  $\langle 111 \rangle$  directions, thus reclined to the surface. For both, vertical (grown on a {111}B substrate) and reclined nanowires it is common that their nucleation is guided by Au catalyst. We show that on the {001}-type surfaces the Au droplets carry an additional crucial role that necessarily precedes the nanowire emergence, i.e., they assist formation of nano-craters with strongly faceted {111}B side walls. Au-induced formation of craters and the onset of nanowires on the {111} facets inside the craters are confirmed by the results of Monte Carlo simulations.

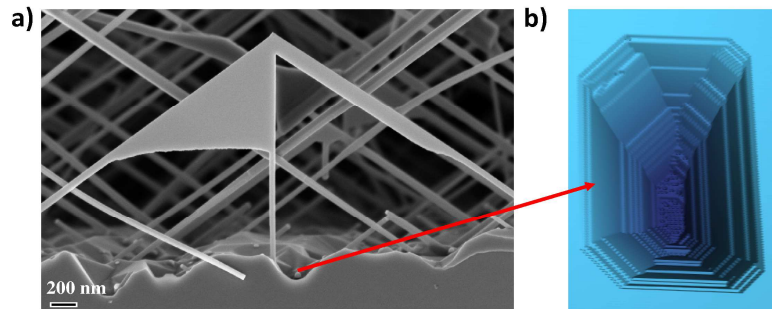


Fig.1 a) SEM image of the K-shape InAs nanowire; b) Monte Carlo simulated picture of crater with the {111} oriented facets.

[1] J.-H. Kang, M. Galicka, P. Kacman and H. Shtrikman, *Nano Letters*. **17**, 531 (2017).